

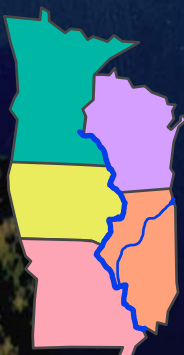
FINAL
INTEGRATED FEASIBILITY REPORT AND
PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT
for the
UMR-IWW System Navigation Feasibility Study

24 September 2004

*“To seek long-term sustainability of the
economic uses and ecological integrity of the
Upper Mississippi River System”*



**US Army Corps
of Engineers®**



EXECUTIVE SUMMARY

PURPOSE

The purpose of this document is to provide a comprehensive documentation of the Upper Mississippi River-Illinois Waterway (UMR-IWW) System Feasibility Study process and recommended plan of action. Traditionally, the Feasibility Report and Programmatic Environmental Impact Statement (PEIS) are produced as two separately bound documents. However, a single integrated document meets the requirements of the National Environmental Policy Act (NEPA) and the Corps of Engineers decision-making process without duplication. The main table of contents includes asterisks for those traditional NEPA required chapters and sections to allow ready access for those specifically interested in the NEPA compliance review.

The report organization and contents are intended to allow the reader to become familiar with the background and history of this magnificent river system leading to the current study including a full disclosure of decision process and compliance with Corps policy and guidance in addition to applicable Federal and State laws. The information provided in Chapters 1 through 3 establishes a review of the study purpose, history, organizational structure, and decision process. Chapters 4, 6, 7, and 12 provide a comprehensive description and explanation of the UMR-IWW System Navigation Study decision process leading to the identification of a Recommended Plan for Ecosystem Restoration and Navigation Efficiency (Chapter 14). Chapters 5, 8, 9, 10, and 11 provide legally required disclosure and documentation concerning the direct, indirect, and cumulative environmental effects attributable to the proposed actions as well as appropriate avoid, minimize, and mitigation measures. Chapter 13 outlines the process followed by this study during the public review period (May 14 – July 30, 2004) and a summary of the comments received from Federal and State agencies, non-governmental organizations and the public. Chapter 15 provides a listing of the Corps team that assisted in the preparation of this document. Chapter 16 provides a comprehensive listing of the 140+ technical reports (with abstracts) that were generated over the course of this decade-long study. Chapter 17 lists the references cited in the document. Chapter 18 includes a listing of the individuals and organizations that received a hardcopy of this Final document. The appendices included on the enclosed Compact Disc contain electronic copies of several thousand pages of detailed information documenting the methodology, results, and conclusions for each of the primary study components: Engineering, Economics, Environmental Impacts, Ecosystem Sustainability, Public Involvement, Real Estate, and Quality Management. Two additional appendices are also provided that: (1) convey the responses to comments received during the review period for the draft version of this document (May 14 – July 30, 2004); and (2) document the guidance memorandums that have shaped and guided the study since August 2001.

BACKGROUND AND NEED FOR ACTION

The study was initiated in April 1993 to address the potential economic losses to the Nation for significant traffic delays at locks on the commercial navigation system between 2000 and 2050. In 2001, the study was restructured to address the ongoing cumulative effects of navigation, and the ecosystem restoration needs, with a goal of attaining an environmentally sustainable navigation system, in addition to insuring an efficient transportation system for the future. The study area extends from Minneapolis-St. Paul downstream to the confluence of the Ohio River and the Illinois Waterway from Grafton, Illinois, upstream through the Thomas J. O'Brien Lock in Chicago. It includes 37 locks (29 on the UMR and 8 on the IWW) and approximately 1,200 miles of navigable waterway within portions of Illinois, Iowa, Minnesota, Missouri, and Wisconsin. The principal navigation problem addressed by this study is the potential for significant traffic delays on the UMR-IWW Navigation

System within the 50-year planning horizon. The principal environmental problems addressed by this study are changes to ecosystem structure and function that have occurred since initiation of the operation and maintenance of the existing 9-Foot Channel Navigation Project. The primary opportunities are to reduce or eliminate commercial traffic delays and improve the national and regional economic conditions while restoring, protecting, and enhancing the environment. The goal of the feasibility study is to outline an integrated plan to ensure the economic and environmental sustainability of the UMR-IWW Navigation System to ensure it continues to be a nationally treasured ecological resource as well as an efficient national transportation system as designated by Congress in the 1986 Water Resources Development Act (Public Law 99-662).

STUDY PROCESS

The study generally followed the Corps of Engineers 6-step planning process including identification of problems and opportunities, inventory of forecast resource conditions, formulation of alternatives, evaluation of alternatives, comparison of alternative plans, and selection of a recommended plan. The PEIS is intended to provide a detailed accounting of potential environmental consequences resulting from the proposed Federal action and includes a description of affected environment, environmental effects, cumulative effects, and statutory and other applicable requirements. The study included a high degree of collaboration with Federal and State agencies, non-governmental organizations, and the public.

INVENTORY AND FORECAST RESOURCE CONDITIONS

Importance of the System

Traffic usage and tonnage increased rapidly through the 1970s, but growth rates have flattened considerably since the 1980s. Traffic increased by a factor of 8 between 1950 and 1980. Between 1965 and 2002, commercial traffic increased by an annual average growth rate of 2.2 percent for the UMR reach, 1.2 percent for the IWW reach, and 3.0 percent for the Middle Mississippi River (MMR) reach. Traffic is greatest at the downstream end of the navigation system as different regions add or consume commodities in the downstream or upstream direction, respectively. For the 10-year period 1990-1999, delays per tow averaged 3.4 hours at Locks 20-25; 2.2 hours at Locks 14-18; 0.9 hour at Locks 8-13; and 0.4 hour for Upper St. Anthony Lock to Lock 7. The system carried approximately 50 percent of the Nation's corn and 40 percent of the Nation's soybean exports in 2002. The existing system generates an estimated \$1 billion of transportation cost savings to the Nation. These benefits compare with the annual operation and maintenance costs of approximately \$115 million.

The Upper Mississippi River System is also considered a tremendous natural resource. The ecosystem consists of hundreds of thousands of acres of bottomland forest, islands, backwaters, side channels, and wetlands—all of which support more than 300 species of birds, 57 species of mammals, 45 species of amphibians and reptiles, 150 species of fish, and nearly 50 species of mussels. More than 40 percent of North America's migratory waterfowl and shorebirds depend on the food resources and other life requisites (e.g., shelter, nesting habitats, etc.) that the system provides. The system's ancient fish and freshwater mussels are a unique and significant fauna. The Upper Mississippi River System (UMRS) and associated environments have a rich record of human history spanning over 12,000 years. It also provides boating, camping, hunting, trapping, and other recreational opportunities to more than 11 million visitors each year. Needs for the ecosystem are presented as objectives for the desired future condition of river habitats and ecological processes.

Future Without-Project Condition

The future without-project condition defines what the likely and foreseeable conditions will be for the system in the absence of any Federal action. The without-project condition serves as a baseline against which alternative plans are evaluated. The future demand for waterway transportation is a key factor in defining the without-project condition and determining the need for future navigation improvements. A scenario-based approach to traffic forecasting was used to address the inherent uncertainty in forecasting economic conditions over the 50-year planning horizon. Such an approach follows recommendations provided by the Federal Principals Task Force, which includes members from the Departments of Transportation, Interior, and Agriculture, and the Environmental Protection Agency. The scenarios developed represent a range of alternative views of the future demand for navigation on the UMR-IWW System. A consequence of applying a scenario-based approach to traffic forecasting is multiple representations of the without-project condition. Specifically, this approach is intended to define a range of plausible alternative future scenarios that ultimately describe the demand for inland waterway transportation. It was assumed that some Federal and non-Federal actions would take place to a limited degree as traffic increases to insure best utilization of the system in the overall public interest, including economic efficiency, safety, and environmental impact.

The impacts of human activities on the ecosystem have resulted and continue to result in a decline in the environmental quality of the UMRS. The resource impacts include backwater and secondary channel sedimentation, altered hydrology, loss of connectivity of the floodplain to the river, impeded fish migration, loss of island habitat, endangered plant and animal species, and loss of native plant community diversity and abundance. Large increments of ecosystem decline can be attributed to the construction and operation of the navigation system, but there are many ecological stressors contributing to ecosystem degradation including land use changes, floodplain development, exotic species, sedimentation resulting from land use practices, construction of the levee system, and non-point source pollution. The primary authority available to the Army Corps of Engineers to address this decline is the Environmental Management Program (EMP), established by the Water Resources Development Act (WRDA) of 1986. The feasibility study has concluded that the current level of authority and authorized appropriations in the EMP and national programmatic authorities and the limited environmental management activities available under a single-purpose navigation project have been insufficient to meet the environmental needs on the UMRS. Degradation of the system will continue in the future in the absence of any additional Federal action.

FORMULATION OF ALTERNATIVES

Navigation Efficiency Alternatives

The formulation of navigation efficiency alternatives began by identifying measures that meet the planning objective of providing a safe, reliable, efficient, and sustainable UMR-IWW Navigation System over the planning horizon. Navigation efficiency improvement measures can be categorized into either small-scale or large-scale improvements. “Small-scale” measures of reducing traffic congestion can generally be defined as any navigation improvement less costly than constructing a new lock. More than 92 small-scale measures were considered and divided into the categories of “structural” measures (requiring some amount of construction to implement) and “nonstructural” measures (those not requiring construction, but rather procedural or policy changes). The overall performance (total lock transit time reduction) of small-scale measures is generally less effective and less efficient than demonstrated with the large-scale measures. “Large-scale” measures involve constructing a new 1,200 foot lock or extending the existing lock to 1,200 feet. Passage through a 1,200 foot lock can be accomplished in a single lockage as opposed to the current double lockage process. Qualitative and quantitative screening processes were applied to reduce the number of measures for further evaluation and combination into alternatives. The measures that survived the

screening processes include mooring facilities, switchboats, congestion fees, deck winches and excess lockage time charges, lock extensions, and new locks. These measures were combined into the following alternatives.

Alternative 1: No Action. The no action, or without-project condition, describes the future in the absence of additional Federal action.

Alternative 2: Congestion Fees Implemented through a Lockage Fee (imposed on commercial traffic). The objective of this form of congestion fees is to improve overall system efficiency by charging all users a lock usage fee, subsequently inducing marginal users (those that benefit the least from system use) to leave the system.

Alternative 3: Deck Winches and Excess Lockage Time Charges. Installation of deck winches was evaluated as a means of generating additional operating efficiency. It was assumed that installation of winches would be motivated by the prospect of having to pay a fee if lockage time exceeded a specified threshold. A training program for barge operators and installation of deck winches are the two components of the measure.

Alternative 4: Moorings (12, 14, 18, 20, 22, 24, and La Grange); Switchboats at Locks 20-25. Moorings are tie-off facilities that allow the next tow to be served to wait closer to the lock chamber; switchboats would assist in handling the cuts of a double lockage, resulting in a shorter lockage time.

Alternative 5: Moorings (12, 14, 18, 24, and La Grange); Lock Extensions at Locks 20-25; Switchboats at Locks 14-18, La Grange, and Peoria. This alternative extends UMR Locks 20-25 to 1,200 feet by adding on to the original lock structure.

Alternative 6: Mooring (12, 14, 18, and 24); New Locks at 20-25, La Grange, and Peoria; Lock Extensions at 14-18; and Switchboats at Locks 11-13. This alternative includes new 1,200 foot locks at UMR 20-25, and also at Peoria and La Grange on the Illinois Waterway.

Ecosystem Restoration Alternative

The formulation of Ecosystem Restoration Alternatives began by identifying broad ecosystem goals that meet the planning objective of addressing cumulative impacts including ongoing effects of the operation and maintenance of the UMR-IWW Navigation System. This umbrella objective was further defined into systemic goals and site-specific objectives. These objectives were used to identify suitable types and numbers of ecosystem management and restoration measures. Improvements to the UMRS ecosystem can be accomplished by influencing the function and structure of the system with these actions.

Approximately 400 individual regulatory, operational, and structural actions were identified and reviewed for their potential to address UMRS environmental objectives. Twelve overarching categories of restoration measures (Table EX-1) were selected after considering input from UMRS stakeholders, coordinating committees, and the Navigation Study Science Panel.

Table EX-1. UMRS ecosystem restoration measures.

• Island Building	• Water Level Management – Backwater
• Island Protection	• Backwater Restoration (Dredging)
• Shoreline Protection	• Side Channel Restoration
• Fish Passage	• Wing Dam/Dike Alteration
• Floodplain Restoration	• Improve Topographic Diversity
• Water Level Management – Pool	• Dam Point Control

These measures were combined to form the following ecosystem restoration alternatives.

Alternative A: No action/Without project. Current environmental management activities and rehabilitation efforts continue at historic levels.

Alternative B: No net loss. Protect and maintain existing environmental diversity (current mosaic of habitat types and ecological diversity maintained into the future: no net loss).

Alternative C: Restore the first increment of habitats most directly affected by the navigation project.

Alternative D: Restoration to an intermediate level, which includes management practices and cost effective actions affecting a broad array of habitat types.

Alternative E: Restoration to a high level, which includes most environmental objectives that could be accomplished in the context of the navigation project.

Adaptive Management

Implementation of any alternative needs to be done in the context of a comprehensive and integrated plan for river management because many system components are intrinsically linked. Making decisions to address and resolve the complex assortment of ecological needs and objectives within the UMRS should be conducted in the context of a long-term commitment to a policy of adaptive management. Adaptive management is a process that seeks to aggressively use management intervention as a tool to strategically probe the functioning of an ecosystem. Management measures are designed to test key hypotheses about the structure and functioning of the ecosystem. Adaptive management identifies uncertainties, and then establishes methodologies to test hypotheses concerning those uncertainties. It uses management actions as tools to not only change the system, but as tools to learn about the system.

EVALUATION OF ALTERNATIVE PLANS

Navigation Efficiency Alternatives

The navigation efficiency alternatives were evaluated using the system of four primary accounts established in the *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* (P&G). These accounts have been devised to encompass all significant effects of a plan as required by the National Environmental Policy Act of 1969 (NEPA). The accounts established by the P&G include national economic development (NED), regional economic development (RED), environmental quality (EQ), and other social effects (OSE). Three

additional accounts were established for comparative considerations and include Contribution to Planning Objectives (safety, reliability, efficiency, and sustainability), Acceptability, and Adaptability.

National Economic Development. The NED provides a measurement of the monetary impacts to the national economy. These impacts include both positive effects (primarily transportation efficiencies) and negative effects (costs required to implement and operate each alternative, including site-specific and system mitigation costs). The NED is measured as annual net benefits, which are defined as the difference between annual benefits and annual costs. Positive net benefit numbers represent benefits to the Nation, and negative net benefit numbers represent a loss to the Nation. This evaluation recognizes the uncertainty associated with the future demand for waterway transportation and the lack of definitive data on demand elasticity for commodities shipped on the river, particularly grain. Five different scenarios represent the uncertainty in future demand for waterway transportation. The uncertainty in demand elasticity is being represented by the use of three different economic modeling conditions. The question of demand elasticity centers on the issue of how the demand for waterway shipment of commodities responds to rising transportation costs. The condition reflecting an inelastic state is represented by the Tow Cost Model (TCM), while the ESSENCE Model represents the upper (E_{UB}) and lower (E_{LB}) bounds of an elastic condition. Net benefits were computed for each scenario and each assumption of elasticity, which results in 15 different economic conditions (given five traffic scenarios and three economic model specifications). Figure EX-1 displays the net benefits computed for each alternative and economic condition.

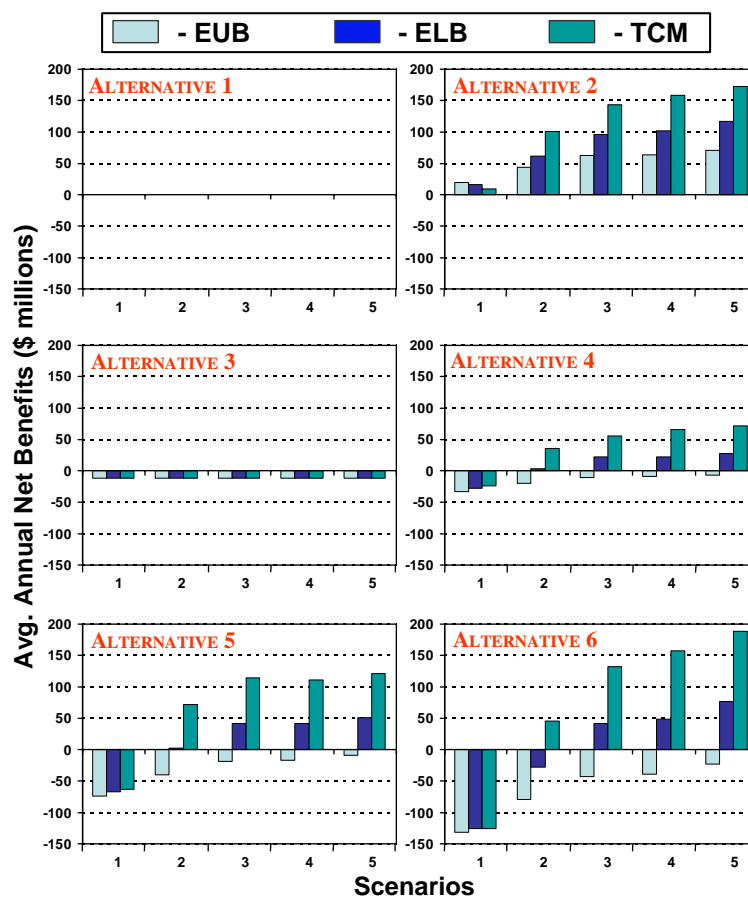


Figure EX-1. Average annual net benefits (\$ millions) for navigation efficiency alternatives across the range of 15 possible economic conditions created by the use of five scenarios and three economic models.

EXECUTIVE SUMMARY

Environmental Quality. The environmental consequences of navigation improvements were determined, and avoid, minimize, and mitigation measures were considered for each alternative. Both construction site impacts and system impacts resulting from traffic increases were considered. This was used in an ecological risk assessment framework to determine the incremental traffic effects on fisheries, submersed aquatic vegetation, bank erosion, backwater and side channel sedimentation, and historic properties. The site-specific and the systemic environmental consequences were assessed and monetized for each of the navigation efficiency alternatives and are displayed in Table EX-2.

Table EX-2. Description of avoid, minimize, and mitigation measures recommended to offset the incremental effects of additional commercial traffic resulting from the navigation efficiency alternatives.

Alternative 4	Environmental Impacts	Mitigation Cost
Bank Erosion	Increase erosion on 10.8 miles of shoreline	\$ 17,563,523
Backwater and Secondary Channel	Increase sedimentation at 31 sites	\$ 29,390,769
Plants	Degrade 5.5 miles of plant beds	\$ 3,306,020
Fish	8,360,000 fewer fish in the river	\$ 13,167,619
Monitoring	43 studies and 40 years of bioresponse monitoring	\$ 7,171,441
Historic Properties	Potential destruction of 100 historic sites	\$ 9,500,000
Site Specific	Construction site impacts of 1 mooring cell	\$ 4,764,413
Administration	50 years	\$ 8,486,379
Total		\$ 93,350,164

Alternative 5	Environmental Impacts	Mitigation Cost
Bank Erosion	Increase erosion on 10.8 miles of shoreline	\$ 17,563,523
Backwater and Secondary Channel	Increase sedimentation at 31 sites	\$ 29,390,769
Plants	Degrade 19 miles of plant beds	\$ 12,021,890
Fish	22,800,000 fewer fish in the river	\$ 36,196,040
Monitoring	Studies and 40 years of bioresponse monitoring	\$ 9,400,000
Historic Properties	Potential destruction of 105 historic sites	\$ 10,200,000
Site Specific	Construction site impacts of 1 mooring cell, 5 locks	\$ 15,127,011
Administration	50 years	\$ 12,989,923
Total		\$ 142,889,156

Alternative 6	Environmental Impacts	Mitigation Cost
Bank Erosion	Increase erosion on 10.8 miles of shoreline	\$ 17,563,523
Backwater and Secondary Channel	Increase sedimentation at 31 sites	\$ 29,390,769
Plants	Degrade 27.5 miles of plant beds	\$ 16,530,098
Fish	28,360,000 fewer fish in the river	\$ 59,156,934
Monitoring	67 studies and 40 years of bioresponse monitoring	\$ 14,292,780
Historic Properties	Potential destruction of 112 historic sites	\$ 10,590,000
Site Specific	Construction site impacts of 1 mooring cell, 12 locks	\$ 37,297,628
Administration	50 years	\$ 18,482,173
Total		\$ 203,303,905

Note: Alternatives 1, 2, and 3 have no mitigation costs associated with them.

Regional Economic Development. The income and employment benefits for each alternative were computed for the States of Minnesota, Wisconsin, Iowa, Illinois, and Missouri, along with the Lower Mississippi River region and the rest of the United States. These income and employment effects are derived from direct construction expenditures required to implement an alternative and from the transportation efficiencies generated by the alternative.

Other Social Effects. The positive or negative impacts of waterway traffic versus rail for the categories of emissions, accidents, noise and other community impacts are provided for each alternative. A positive number indicates a project benefit, while a negative number indicates a project cost or disbenefit.

Planning Objectives. Each alternative was evaluated for its contribution to meeting the objective of providing a safe, reliable, efficient, and sustainable UMR-IWW Navigation System.

Acceptability. Institutional and social acceptability of the alternatives with respect to acceptance by Federal, State, and local entities and the general public can be viewed in Chapter 13, Stakeholders Perspective.

Adaptability. Each alternative was evaluated for its ability to adjust, based on changes in future conditions or the degree to which the commitment is reversible. Small-scale measures are generally more adaptable than large-scale measures.

Ecosystem Restoration Alternatives

Ecosystem restoration alternatives were evaluated under seven accounts of National Ecosystem Restoration (NER) Benefits, Environmental Quality, Regional Economic Development, Other Social Effects, Contribution to Planning Objectives, Acceptability, and Adaptability. National Ecosystem Restoration (NER) benefits is pursuant to Engineer Regulation 1105-2-100 and the next three are pursuant to the Principles and Guidelines (P&G) primary accounts to facilitate an evaluation process. Within these accounts, the four P&G evaluation criteria of completeness, efficiency, effectiveness, and acceptability are included to provide the primary basis of comparing and evaluating the ecosystem alternative plans.

Environmental Benefits - National Ecosystem Restoration (NER). The environmental equivalent to the NED is the National Ecosystem Restoration (NER) benefits, which is the plan that reasonably maximizes ecosystem restoration benefits compared to costs. The benefits are expressed in terms of acres of influence, which is the area positively affected by the restoration measure. The summary of these results is shown on Figure EX-2.

Environmental Quality (EQ). Environmental quality effects were evaluated primarily by assessing the ability of the alternative to fully address the needs of the UMRS ecosystem. By examining the number, type, and potential results of restoration measures, the completeness and diversity of ecosystem alternatives were quantitatively and qualitatively assessed. This process included identifying the extent to which the alternative plan maintains or exceeds the existing condition, accounts for ecosystem needs identified in the virtual reference, accounts for nine essential UMRS ecosystem objectives identified in *A River that Works and a Working River* report, and affects ecosystem diversity. Figure EX-2 contains a summary of the evaluation results for NER and EQ.

Regional Economic Development (RED). The income and employment benefits for each alternative were computed for the states of Minnesota, Wisconsin, Iowa, Illinois, and Missouri along with the Lower Mississippi River region and the rest of the United States. RED benefits are presented as average annual income and average annual jobs created from 2005 to 2035. The RED assessment

considered only income and employment directly related to alternative construction, which made up approximately 75 percent of the total alternative cost.

Other Social Effects (OSE). Other social effects were considered primarily in the form of ecosystem goods and services maintained or enhanced by the alternative plans (e.g., water quality, nutrient processing, recreation, commercial fishing, etc.).

Contribution to Planning Objectives. Each alternative was evaluated for its contribution to meeting the objective of addressing the cumulative impacts including ongoing effects of the operation and maintenance of the UMR-IWW Navigation System.

Acceptability. Institutional and social acceptability of the alternatives with respect to acceptance by Federal, State and local entities and the general public can be viewed in Chapter 13, Comments and Views.

Adaptability. Each alternative was evaluated for its ability to adjust, based on changes in future conditions or the degree to which the commitment is reversible.

ECOSYSTEM RESTORATION ALTERNATIVES						
Alternative Evaluation Results						
ACCOUNTS	ALTERNATIVE PLANS					
	A	B	C	D	E	Other
A. Environmental Benefits (NER)	Rank					
A1. Project Cost						
A1a. Total Cost	\$0.0	\$1,691,700,000	\$2,816,600,000	\$5,182,800,000	\$8,416,700,000	
A1b. Cost (w/out Fish Passage or WLM)	\$0.0	\$1,561,900,000	\$2,686,800,000	\$4,262,700,000	\$6,272,800,000	
A1c. Total Average Annual Cost (Base Year 2005)	\$0.0	\$35,080,000	\$58,400,000	\$106,290,000	\$174,520,000	
A2. Env. Benefits (Acres of Influence) (w/out FP or WLM)	0	119,800	223,700	388,300	604,100	
A3. Cost Effectiveness						
A3a. Alternative Cost Effectiveness (A1b ÷ A2)	\$0	\$13,000	\$12,000	\$11,000	\$10,400	
A3b. Water Level Management Cost Effectiveness	-	High	High	High	Moderate	
A3c. Fish Passage Cost Effectiveness	-	-	-	High	Moderate	
B. Environmental Quality	Rank/Considerations					
B1. Completeness						
B1a. Relation to Existing Condition	Lose	Maintain	Restore	Restore	Restore	
B1b. Proportion of the Ecosystem Measures	0%	43%	56%	70%	83%	
B1c. UMRCC Env. Objectives (River that Works R.)	0/9	6/9	7/9	8/9	8/9	
B2. Ecosystem Diversity						
B2a. Maintain viable populations of native species in situ.	-	Low	Moderate	High	High	
B2b. Represent all native ecosystem types across their natural range of variation.	-	Low	Moderate	High	High	
B2c. Restore and maintain evolutionary and ecological processes (i.e., disturbance regimes, hydrological processes, nutrient cycles, etc.).	-	Low	Low	Moderate	High	
B2d. Integrate human use and occupancy within these constraints.	-	-	-	-	-	

Figure EX-2. Partial copy of the Ecosystem Restoration Alternative Evaluation Scoresheet.

CUMULATIVE EFFECTS

The cumulative effects of the navigation project and other human activity in the UMRS basin create a without-project future for the UMRS ecosystem that would include fewer backwater acres, less water depth in non-channel habitats, degraded forest structure and land cover diversity, and uncoordinated floodplain management. Deep backwaters, grasslands, hardwood forests, and marsh are the most threatened habitats. The game and non-game animals that depend on the diverse river ecosystem would decline commensurate with the decline of river habitats. River regulation, sedimentation, and floodplain development are considered primary stressors. The direct effects of the navigation efficiency alternatives were considered in light of these ongoing cumulative effects. The adaptive

implementation of the proposed mitigation plan will offset these direct effects. The recommended ecosystem restoration plan was designed to compensate for other cumulative effects including the ongoing effects of operation and maintenance activities. The ecosystem restoration alternatives developed for this study were structured to address aspects of a sustainable ecosystem associated with the Navigation project. It is important to note that the Navigation Study recommendation for ecosystem restoration alone cannot achieve full system sustainability because many issues are beyond the reach of the navigation project. True sustainability can only be met through the integration of upland and main stem resource objectives and management actions.

COMPARISON OF ALTERNATIVE PLANS

Navigation Efficiency Alternatives

The comparison of alternative plans is an iterative process that involves comparison of the NED benefits initially, and then across the additional criteria of environmental quality, RED, and other social effects, contributions to planning objectives, acceptability and adaptability. Alternative 3 Deck winches is screened from further consideration since it produces negative benefits across all economic conditions. Alternative 2 Congestion fees is screened from further consideration since it fails to fully meet the planning objectives of economic sustainability by limiting growth on the system. In addition, current law prohibits congestion fees, and current national policy makes institutional acceptability of this alternative doubtful. The NED and other criteria comparison of Alternatives 4, 5, 5B and 6 do not result in a clear best alternative as indicated in the premise set comparison in Table EX-3.

Table EX-3. Alternative that maximizes net benefits for each economic condition based on premise set comparison.

Demand Elasticity Assumption	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
TCM	Alternative 1	Alternative 5	Alternative 6	Alternative 6	Alternative 6
ELB	Alternative 1	Alternative 4	Alternative 5B	Alternative 6	Alternative 6
EUB	Alternative 1	Alternative 1	Alternative 1	Alternative 1	Alternative 1

*Scenario 3 ELB average annual net benefits are essentially equal for Alternative 5 (\$41 million); Alternative 5B, a variation of alternative 5 (\$44 million); and Alternative 6 (\$42 million).

The need for navigation efficiency improvements is very much dependent on the assumptions of demand elasticity and traffic forecasts. The no growth scenario 1 results in no action being needed and the high growth scenarios 3, 4, and 5 result in the need for Alternative 6 implementation. Implementation of any plan needs to be done in an adaptive framework.

Ecosystem Restoration

The comparison of ecosystem restoration plans is also an iterative process that involves comparison of the NER benefits initially, and then across the additional criteria of environmental quality, RED, and other social effects, contributions to planning objectives, acceptability and adaptability. Based on assessment of these key evaluation criteria, it was determined that Alternative D outperforms Alternative E because it contains measures that are more effective and have a greater likelihood of success. Though D and E were very close in their overall ranking, Alternative D was identified as the recommended alternative primarily because it is likely to achieve a high degree of completeness and diversity in the most efficient manner. Based on stakeholder input and discussion, the existing Alternative D measures have been further refined to include embankment lowering at lock and dam sites to promote floodplain connectivity and include the addition of measures that reduce water level

fluctuation on the Illinois River in an effort to improve aquatic habitat. The revised alternative is designated D*.

MAJOR AREAS OF CONTROVERSY

The following items represent the major areas of concern as expressed by some agencies and organizations, followed by the approach used to address the concerns in the study.

The proposed 15 year Ecosystem Restoration Authority is insufficient to begin serious restoration efforts. The recommended plan is to seek approval of a \$5.3 billion 50-year framework for ecosystem restoration, including authorization for the first 15-year increment at \$1.462 billion. This alternative contains the measures that were found to be the most cost effective and have a greater likelihood of success. Authorization for additional increments would be contingent upon a future report submitted to Congress. This adaptive implementation approach will provide sufficient time to plan, design, construct, and monitor the performance of a diverse group of measures. It also includes application of research to be conducted to better understand the ecological response of measures and guide future investments.

Funding of ecosystem restoration needs to be predominately Federal funding. The proposed regional cost sharing arrangement as supported by the Mississippi Valley Division, States, U.S. Fish and Wildlife Service is for a combination of 100 percent Federal and cost-shared 65 percent Federal and 35 percent non-Federal funding for implementation of the ecosystem restoration portion of the plan. The recommended ecosystem restoration framework plan consists of an estimated 1,010 projects with a combined first cost of about \$5.3 billion, of which \$4.25 billion is proposed to be 100 percent Federal.

The Scenarios developed to represent the future traffic forecasts do not represent a valid picture for the future. The recommended plan recognizes the uncertainty in demand for waterway transportation especially grain, and has accounted for the uncertainty by the development of an adaptive implementation strategy. The Department of Transportation and Agriculture concur that the scenarios represent a plausible range of future demand for grain exports. The traffic scenarios calling for traffic increases have been recently characterized by the U.S. Department of Agriculture as consistent with their Baseline Projections for grain exports. In a letter of February 24, 2004 the Administrator of the Agricultural Marketing Service indicates that the USDA's latest Baseline Projections show corn exports increasing by 53 percent for the next decade and that the Baseline increase in export growth is consistent with the positive growth scenarios used in the Corps' feasibility study. The USDA's Chief Economist, estimated that corn exports through the Gulf of Mexico would increase 29 to 36 percent by 2014.

Use of the Tow Cost and ESSENCE economic models are not sufficient to make an investment decision. The feasibility study recognizes that the current economic models available to the Corps of Engineers have strengths and weaknesses. Rather than using a single model, the study utilizes two economic models and five potential future traffic scenarios to display a range of potential benefits for the navigation improvements being evaluated. The result is that the uncertainties surrounding the justification of the navigation efficiency improvements are fully displayed for decision makers in the Administration and the Congress. The Corps is actively engaged in a research program to improve its economic modeling capability but the results of this research are years away from potential application to navigation studies. The adaptive implementation strategy includes reevaluation with new economic models when they become available in the future. The Corps has initiated a research effort, outside this study, to develop new economic forecasting models that incorporate spatial equilibrium concepts. Upon the completion, testing, peer review, and acceptance of such models, an evaluation report would

be prepared utilizing these new tools to re-evaluate UMR-IWW commercial traffic forecasts. This report would convey this new information to Congress along with the Corps' recommendation whether or not to stop or delay construction based upon changes in traffic forecasts.

The study needs to fully evaluate non-structural measures. The recommended alternative calls for immediate implementation of small-scale measures such as mooring cells and switchboats at the most heavily utilized locks while larger scale measures are planned and designed. The Feasibility Study concluded that master scheduling and congestion fees, were impractical to implement due to operational and market characteristics of the system. The Corps is committed to the development and testing of an appointment scheduling system during the adaptive implementation process.

Public REVIEW AND COMMENT

The Draft Integrated Feasibility Report and Programmatic Environmental Impact Statement public review period extended from May 14 to July 30, 2004. Nearly 40,000 comments on the draft report were received from over 4,300 persons during the public comment period. The global importance of this issue is reflected in the fact that email responses were received from each of the 50 States, in addition to Washington, D.C., and Canada. The comments ranged from complete support of the recommended plan to support for returning the river to its natural state. These views are not necessarily those of the general public, since they do not constitute a valid random or representative sample of the general public. Thus, although this information can provide insight into the perspectives and values of the respondents, it does not necessarily reveal the desires of society as a whole.

The State and Federal agencies generally agreed with the adaptive implementation strategy central to the recommended plan. They felt this approach would provide the opportunity to re-evaluate investment decisions as more information is obtained. The navigation and agriculture non-governmental organizations generally endorsed the recommended plan with a heavy emphasis on supporting infrastructure improvements. The environmental non-governmental organizations generally support more ecosystem restoration than contained in the recommended plan and support the desire to have nonstructural and small-scale measures implemented prior to any consideration for large-scale improvements such as new locks.

Chapter 13 contains a summary of report comments and stakeholder views received during the May 14 – July 30 review period. A complete record of comments, responses, and letters can be found in the Response to Comments Appendix.

RECOMMENDED PLAN: DUAL PURPOSE INTEGRATED PLAN

The UMRS is a multi-purpose river system that provides economic and environmental benefits to the Nation. The stakeholders of the UMRS have expressed their desire to seek a balance between the economic, ecological, and social conditions to ensure the waterway system continues to be a nationally treasured ecological resource as well as an efficient national transportation system. It is proposed that an integrated plan be approved as a framework for modifications and operational changes to the Upper Mississippi River and Illinois Waterway System to provide for navigation efficiency and environmental sustainability, and to add ecosystem restoration as an authorized project purpose. The integrated plan will provide better focus and flexibility to adaptively manage the operation and maintenance of the system for both navigation and the environment. The plan will include a long-term framework (Alternatives 4 and 6) for navigation efficiency improvements to include small-scale structural and nonstructural measures, new 1,200-foot locks and lock extensions, and appropriate measures to avoid, minimize, and mitigate for environmental impacts at a first cost of \$2.4 billion plus annual switchboat operation costs of \$18 million. It also includes a \$5.3 billion long-term framework

(Alternative D*) ecosystem restoration plan to be accomplished in cooperation with the U.S. Fish and Wildlife Service, the five States, and private non-profit groups to improve the natural resources of the river through projects for habitat creation, water level management, fish passage, and floodplain restoration.

Recommended Cost Sharing Plan

The proposed cost sharing arrangement is for a combination of 100 percent Federal and cost-shared 65 percent Federal and 35 percent non-Federal funding for implementation of the ecosystem restoration portion of the plan. The 100 percent Federal funding is proposed for those ecosystem restoration measures that primarily address the ongoing impacts of the existing 9-foot navigation project. There are three primary reasons for recommending a large proportion of 100 percent Federal funding: (1) there are extensive Federal resources within the waterway including almost 285,000 acres of National Wildlife and Fish Refuges; (2) there is a large role that the operation of the existing 9-foot navigation project has played in the environmental degradation addressed by the ecosystem restoration plan; and (3) there is the interstate nature of the navigation system and the fact that it passes through five different states significantly complicating any cost sharing arrangements. The operation, maintenance, replacement, repair and rehabilitation costs are proposed to be assumed by the agency with management responsibility for the land on which the project is located or the operation and maintenance responsibility for the structure being modified. The plan also includes seeking authority to allow for Federal participation (100 percent Federal or cost shared as applicable) in major rehabilitation of projects damaged in major flood events.

The recommended ecosystem restoration framework plan consists of an estimated 1,010 projects with a combined first cost of about \$5.3 billion. The total estimated operation and maintenance costs for these projects over a 50-year project life in 2003 dollars are estimated at \$257 million. The first cost of the 100 percent Federal projects is estimated at about \$4.25 billion. The total first cost of the cost shared floodplain restoration projects is estimated at about \$1.05 billion with a Federal share of about \$680 million and a non-Federal share of about \$370 million. Since the majority of the land and water areas of the UMRS are managed by either the U.S. Fish and Wildlife Service or the 5 states, the Corps operation and maintenance responsibility will be largely limited to fish passage facilities, operational costs of water level management, and operation and maintenance of dike and wing dam alterations. These costs are estimated at a total of \$30 million over a 50-year period. The remaining 50-year total operation and maintenance cost of \$227 million will be borne by the U.S. Fish and Wildlife Service, the states and other cost share partners.

The primary partners in the implementation of the ecosystem restoration projects will be the U.S. Fish and Wildlife Service and the states in assuming the operation and maintenance responsibility for completed habitat projects and the states and non-profit entities for cost sharing and operation and maintenance of floodplain restoration projects. The partners have expressed interest in participating in this cost sharing arrangement.

Adaptive Implementation

The integrated plan will be implemented through an adaptive approach that will include checkpoints requiring future reporting to the Administration and Congress. The plan will be administered by the Corps of Engineers in full collaboration with the other Federal and State agencies involved in management of the UMRS. The integrated plan will seek authorization for the following:

- 1. Authorization and immediate implementation of Alternative 4 small-scale structural and nonstructural measures at a total cost of \$218 million to include:**
 - Mooring facilities at Lock and Dams 12, 14, 18, 20, 22, 24 and LaGrange (\$11 million).
 - Switchboats at Lock and Dams 20-25 phased approach (\$207 million for 15 years).

- Appropriate mitigation.
- Cost of construction and mitigation shall be paid 50 percent each from the Inland Waterways Trust Fund and the general fund of the U.S. Treasury.

2. Authorization and immediate implementation of the first increment of Alternative 6 at a total cost of \$1.66 billion to include:

- New 1,200 foot Locks at Lock and Dams 20-25, La Grange, and Peoria (\$1.46 billion).
- Appropriate mitigation (\$200 million for site-specific system effects).
- Adaptive implementation to include the following decision points and Congressional oversight:
 - A notification report at the end of design and before construction contract award that presents (1) all new information resulting from monitoring river traffic and markets, and (2) the results of any improved models and analysis.
 - An evaluation report will be submitted in approximately 5-7 years to the Administration and Congress upon the reevaluation of regional, national and world market conditions and development and application of new peer-reviewed models, concluding with a recommendation on whether or not to stop or delay lock construction. These new models will be subjected to review by scientific peers and the model's acceptability will be based on validated theory, computational correctness, and model appropriateness for the study tasks.
 - An updated feasibility report requiring additional authorization before proceeding with the five lock extensions at Locks 14-18.
- The cost of construction and mitigation shall be paid 50 percent each from the Inland Waterways Trust Fund and the general fund of the U.S. Treasury.

3. Authorization of continued study and monitoring of the system to include:

- Development of an appointment scheduling system.
- Development of a new spatial model.
- Collection of demand elasticity data.
- Monitoring of traffic delays and patterns.
- Monitoring of domestic and global grain market conditions, land use, crop yield technology, and developments in China regarding import trends.
- Cost of the study and monitoring plan shall be paid 50 percent each from the Inland Waterways Trust Fund and the general fund of the U.S. Treasury.

4. Authorization of the first 15 year increment of the Alternative D* framework at a total cost of \$1.462 billion to include:

- a. The following measures shall be specifically authorized for implementation at a total Federal cost of \$250 million and require project implementation reports to be approved by the Secretary of the Army prior to appropriation of funds.
 - Fish passage at Dams 4, 8, 22, and 26, and initial Engineering and Design at Dam 19 (\$209 million total).
 - Dam point control at Dams 25 and 16 (\$41 million total).
- b. A programmatic authority to implement measures that will provide substantial restoration benefits and will include funds for adaptive management and monitoring at a total cost of \$935 million. These measures will include:
 - water level management (i.e., drawdowns) in 12 pools,
 - 23 island building projects,
 - backwater restoration at 33 sites,

- 29 side channel restoration efforts,
- wing dam/dike alteration at 19 locations,
- island/shoreline protection at 73 sites,
- improving topographic diversity at 9 locations,
- 13 dam embankment lowering projects, and
- reduction of water level fluctuation on the Illinois River.

The programmatic authority will include the following:

- Project implementation reports for these measures will be reviewed and approved by the Secretary of the Army (the Secretary)..
 - Total cost of each feature will not exceed \$25 million and will be appropriated from the general fund of the U.S. Treasury.
 - The cost of operation, maintenance, repair, replacement, and rehabilitation for these features shall be the responsibility of the Federal or State agency administering and managing the public land on which the project is located.
 - The costs for major rehabilitation of projects constructed and damaged in major flood events shall be 100 percent Federal within the project and aggregate limits specified above.
 - The cost of a new report at the end of 15 years to be provided to the full Congress for potential authorization of additional increments of the plan.
- c. Authorization for acquisition of 35,000 acres of land for the purposes of floodplain connectivity, wetland and riparian habitat protection and restoration at a total cost of \$277 million. The acquisition shall be from willing sellers. The total Federal cost is estimated at \$180 million and the non-Federal cost is estimated at \$97 million. The cost sharing requirements for this acquisition are as follows:
- The Federal share of the cost of land acquisition and restoration shall be 65%.
 - The non-Federal sponsor shall be responsible for all lands, easements, rights-of-way and relocations necessary to implement the land acquisition and restoration projects.
 - Non-Federal sponsors may include nonprofit entities.
 - Regardless of the date of acquisition, the value of lands or interest in lands and incidental costs for land acquired by a non-federal sponsor in accordance with a project implementation report for any land acquisition and restoration project shall be included in the total cost of the project and credited towards the non-Federal share (35%) of the cost of the project. The value of the lands or interest in the lands and incidental costs for lands acquired by a non-Federal sponsor that exceed the non-Federal share of the land acquisition and restoration project costs shall be reimbursed to the non-Federal sponsor.
 - The non-Federal sponsor shall be responsible for the cost of operation, maintenance, repair replacement, and rehabilitation of projects under this section.
 - The costs for major rehabilitation of projects in this section that are damaged by flood events shall be cost shared.
 - The Secretary may provide credit, including in-kind credit, toward the non-Federal share of land acquisition and restoration projects under this section for the reasonable costs of any work performed in connection with a study, preconstruction engineering and design, or construction that is necessary for project implementation. The credit for the work shall be limited to the non-Federal share and shall not result in any reimbursement.
 - Project implementation reports for these features will be reviewed and approved by the Secretary.

UMR-IWW System Navigation Feasibility Study **Participating Agencies and Organizations**

American Rivers
American Waterway Operators
Audubon Society
Illinois Department of Natural Resources
Illinois Department of Transportation
Illinois State Water Survey
Illinois Stewardship Alliance
Iowa Department of Agriculture
Iowa Department of Natural Resources
Iowa Department of Transportation
Iowa Institute of Hydraulic Research
Midwest Area River Coalition 2000
Minnesota Department of Agriculture
Minnesota Department of Natural Resources
Minnesota Department of Transportation
Mississippi River Basin Alliance
Missouri Department of Conservation
Missouri Department of Natural Resources
Missouri Department of Transportation
National Corn Growers Association
The Izaak Walton League of America
The Nature Conservancy
U.S. Army Corps of Engineers
U.S. Department of Agriculture
U.S. Department of Transportation, Maritime Administration
U.S. Fish and Wildlife Service
U.S. Geological Survey
U.S. Environmental Protection Agency
Upper Mississippi, Illinois and Missouri River Association
Upper Mississippi River Conservation Committee
Upper Mississippi River Basin Association
Wisconsin Department of Natural Resources
Wisconsin Department of Transportation